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The Grignard reaction, since its discovery a few years ago, has been extremely productive of valuable results and appears to be capable of rendering service in this case also. An ingenious application of it, described recently by J. Houben,² constitutes an important advance towards the solution of the general problem described above. The process consists of the following stages: Magnesium, an alkyl haloid and absolute ether are allowed to react in the ordinary manner, to give the Grignard reagent; if ethyl chloride is employed the action may be represented by the equation: $\text{Mg} + \text{C}_2\text{H}_5\text{Cl} \rightarrow \text{MgClC}_2\text{H}_5$. The ethylmagnesium chloride is mixed with the alcohol to be experimented with and there results a hydrocarbon and magnesium alkyl oxy chloride; with *tertiary*butyl alcohol the reaction would be: $\text{C}_2\text{H}_5\text{MgCl} + (\text{CH}_3)_3\text{COH} \rightarrow (\text{CH}_3)_3\text{COMgCl} + \text{C}_2\text{H}_6$. The ethane, of course, escapes. The last step consists in adding acetic anhydride to the above product, which results in the formation of *tertiary*butyl acetate and magnesium acetochloride:



The preceding method has already led to the synthesis of a variety of acetates of geraniol and of terpin series, such as terpin diacetate; the resulting compounds are closely allied with some of the odoriferous materials of plants, and their further study promises results of importance and value. The method also gives good service in the esterification of phenols.

Benzylmagnesium chloride, $\text{C}_6\text{H}_5\text{CH}_2\text{MgCl}$, may be used in place of the ethyl derivative, but curiously enough, the corresponding bromides or iodides can not be employed; with the former the yield is poor and with the latter the reaction is practically inhibited, except in the case of saturated alcohols, for which, however, the bromides are preferable. The results of a more extended investigation of this subject will be awaited with interest.

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² *Ber. d. Chem. Ges.*, **39**, 1736 (1906).

RECENT VERTEBRATE PALEONTOLOGY.

Extinct Mammals of Patagonia.—The third part of the first volume of the *Annales de Paléontologie* under the direction of Dr. Marcellin Boule, professor of paleontology in the Museum of Natural History of Paris, has just been received. It contains the conclusion of Professor Albert Gaudry's review of the fossils of Patagonia, in which this distinguished paleontologist presents the most clear and interesting account of the mammalian life, especially in the Eocene, Oligocene and Lower Miocene. Summaries of the geological results obtained by Hatcher, Ortman, Tournouer, are given, together with a discussion of the environment of the remarkable succession of mammalian life. This is by far the clearest and most interesting presentation we have yet had of the development of this peculiar fauna. The author is a strong believer in the existence of an Antarctic continent; in fact he regards this fauna as the fauna of such a continent. He observes that Patagonia serves to give us a clear idea of its geographical extent by its climate, remarking 'that if Patagonia is not a part of an Antarctic continent its paleontological history is altogether incomprehensible.' It is interesting to contrast this statement with one recently made to the writer by Sir John Murray to the effect that he found no evidence whatever sufficient to convince him even of the existence of such a continent.

Eocene Mammalia of Northern Africa.—By far the most important paleontological event of recent times was the discovery in 1900 of the ancient fauna of the Fayûm. This is the lake province of Egypt, a district occupying a depression in the desert to the west of the Nile Valley opposite Wasta, a small town about fifty-seven miles south of Cairo. From time to time since this discovery Messrs. Beadnell, of the Egyptian Geological Survey; Dames, of Berlin; Stromer, of Munich; Fraas, of Stuttgart, and especially Andrews, of the British Museum of Natural History, have been presenting short contributions to our knowledge of this fauna. We have now received 'A Descriptive Catalogue

of the Tertiary Vertebrata of the Fayûm, Egypt, based on the collection of the Egyptian government in the Geological Museum, Cairo, and on the collection in the British Museum (Natural History), London,' by Charles William Andrews. The volume is a fine quarto of 324 pages, with twenty-six plates, and a large number of text figures, including several restorations. It is no exaggeration to say that it marks a turning point in the history of the mammalia of the world.

First and foremost is the fact that the ancestors of three great orders of mammals, namely, the Hyracoidea, Sirenia and Proboscidea, are definitely carried back to the Upper Eocene, and the birthplace of these orders appears to be firmly established on the great continent of Africa, which was especially distinguished through a very long geological period as a land mass much less affected by submergence than the other continents, and, therefore, a peculiarly favorable theater for the evolution of terrestrial mammals.

Second, the problematical order of Zeuglodontia, aberrant whale-like forms, are definitely carried back to the Middle Eocene and apparently connected firmly with the land-living primitive Carnivores known as Creodonts. This demonstration we owe to a discovery by Professor Eberhard Fraas, of Stuttgart, a fact which is fully set forth in the present work.

Third, we have established here the occurrence of two entirely distinct and extremely aberrant forms of mammals, both of which possibly represent new and distinct orders, namely, *Arsinöitherium* and *Barytherium*. *Arsinöitherium* is now fully known and differs from every other mammal both in its dentition and in the anatomy of the skull, a most remarkable feature of which is a very large and forwardly pointed pair of horns. The limbs are analogous to those of the Proboscidea and Dinocerata.

Fourth, mingled with these aberrant and peculiarly African forms in the Upper Eocene are the only carnivorous types thus far found, namely, the primitive Creodonts, resembling

those of France and North America, and suggesting a land connection and mammalian invasion from Europe. Certain of the Artiodactyl Ungulates characteristic of the Upper Eocene of Europe also appear here, namely, the Anthracotheres.

We may, therefore, consider the hypothesis which was advanced more or less fully and independently in 1900 by Osborn, Stehlin and Tullberg, that Africa was a very important center in the evolution of mammalian life firmly established as a fact; further, that Africa contributed the Hyracoidea, the Sirenia and the Proboscidea to the continents of Europe, Asia and in part to North America.

Some confirmation is also found for the hypothesis which dates back to De Blainville, namely, that widely separated as the Sirenia and Proboscidea are to-day, they may have had a community of origin in Lower Eocene times.

Dr. Andrews is also inclined to regard the evidence which he has now brought together as lending additional support to the theory that in late Mesozoic times Africa and South America were still connected by land. He concludes: 'It appears certain that the final separation of the two continents did not take place till Eocene times,' and that there may have been a chain of islands between the northern part of Africa and Brazil which persisted even till the Miocene. This rests on much more slender evidence than the well-established land connection between Patagonia and Australia, but the résumé which the author gives of the anomalies of distribution which would be explained by such a connection is well worth quoting in full (pp. xxvi-xxvii):

On the assumption that this series of events did happen, there is little difficulty in accounting for most of the peculiarities in the distribution of the various groups. Thus, to mention only a few instances, the presence in both continents of the Hystricomorphine rodents, of chelonians of the family Pelomedusidae, and of the fishes of the family Cichlidae is at once accounted for. So also is the presence in the Santa Cruz beds of *Necrolestes*, apparently a close ally of the Cape Golden moles, and of the Sparassodonta, which,

after all, seem to be creodonts and not marsupials. Furthermore, light is also thrown on the numerous points of similarity between *Struthion*es and the *Rheæ*, especially when it is remembered that a large ratite bird, *Erémopezus*, existed in the Eocene of Africa. As to the ungulates, it seems likely that the separation of the two areas took place when the main divisions were only just beginning to be differentiated, and that groups like the *Pyrotheria* and the *Archæohyracidae* are not ancestral to the *Proboscidea* and *Hyracoidea* of the old world, but more probably represent terms of partly parallel series which had a common ancestry on the common land-surface before the separation of the two regions took place. If this were so, we should expect to meet with a general resemblance between the various groups rather than a close similarity of structure, and this, in fact, is what we find. In the case of the occurrence of the primitive sirenian *Prorastomus* in the West Indies, and of the water-snake *Pterosphenus* in the Eocene beds of Alabama, it seems likely that these animals passed either along the southern coast of the Eocene Atlantic or across the bridge of shallow water between the chain of islands above referred to as probably lying between West Africa and Brazil.

The work is admirably printed and illustrated, and includes reference to all of the literature; and the author as well as the directors and trustees of the British Museum are greatly to be congratulated.

HENRY F. OSBORN.

*THE INTERNATIONAL FISHERY CONGRESS,
1908.*

At the Paris universal exposition of 1900 there was held an international congress of fisheries and pisciculture, a permanent committee on international fishery congresses was formed, and plans were laid for holding such congresses regularly in various countries. The first congress was under the presidency of Professor Edmond Perrier, director of the National Museum of Natural History in Paris. The second congress met in St. Petersburg in 1902, under the presidency of Hon. Vladimir Weschniakow, secretary of state and president of the Russian Imperial Fishery Society. The last congress convened at Vienna in 1905 and was presided over by Professor

Dr. Franz Steindachner, director of the Imperial Museum of Natural History in Vienna. I attended that congress as the representative of the United States, and extended an official invitation to hold the next meeting in America in 1908, the invitation being unanimously accepted. The place of meeting is Washington, D. C., and the time is September 22 to 26 inclusive. It is a source of gratification to announce that the president of the next congress is Dr. Hermon C. Bumpus, director of the American Museum of Natural History.

In connection with the congress there have been arranged a number of competitive awards for the best or most important investigations, discoveries, inventions, etc., relative to fisheries, aquiculture, ichthyology, fish pathology and related subjects during the years 1906, 1907 and 1908. The awards will be in the form of money; and, although the individual amounts are not large, it is hoped that the conferring of the awards by so representative a body will induce many persons to compete and will result in much benefit to the fisheries and fish culture. The following awards have thus far been provided, and others may be announced later:

By the American Fisheries Society: For a paper embodying the most important original observations and investigations regarding the cause, treatment and prevention of a disease affecting a species of fish under cultivation. \$100.

By the American Museum of Natural History: For an original paper describing and illustrating by specimens the best method of preparing fish for museum and exhibition purposes. \$100.

By Forest and Stream: For the best paper giving description, history and methods of administration of a water, or waters, stocked and preserved as a commercial enterprise, in which angling is open to the public on payment of a fee. \$50.

By the Museum of the Brooklyn Institute of Arts and Sciences: For the best paper setting forth a plan for an educational exhibit of fishes, the species and specimens that should be shown, the method of arrangement, and suggestions for making such an exhibit instructive and attractive. \$100.

By the New York Aquarium: For an exposition of the best methods of combating fungus disease in fishes in captivity. \$150.